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J. C. BRANNER, *Director.*

SOME NEW PARASITIC HYMENOPTERA FROM BRAZIL.[1]

By Charles T. Brues.

In a previous publication,[2] I have dealt with part of a very interesting collection of Parasitic Hymenoptera obtained by the Stanford Expedition to Brazil. Only the Ichneumonidæ and Braconidæ were included in the first paper, and the present one contains descriptions of a number of new species belonging to other families. There are many other species, especially in the superfamily Chalcidoidea which it has seemed inadvisable to consider at the present time, mainly on account of the great difficulty experienced in recognizing with certainty many of the species described by early writers. Descriptions of eleven new species and one new genus are given below while thirty-one new species and three new genera were included in the previous report.

FAMILY STEPHANIDÆ.

Fœnatopus aurantiiceps sp. nov.

♀. Length 14 mm.; ovipositor 16 mm.; wing 8.5 mm. Black; head and base of antennæ bright ferruginous; four anterior legs more or less fuscous; tip of hind tibiæ and hind metatarsus fulvous; ovipositor with a subapical white annulus. Head above transversely aciculate, the aciculations between the ocelli curving forward and forming a series of bowed lines enclosed in a shield-shaped margined area that has its anterior angles tuberculate; on each side of the median ocellus is another tubercle which form an equilateral triangle with a third median one below the ocellus. Face with somewhat irregular transverse aciculations below; above, the aciculations curve upwards laterally passing from the median to the lateral

[1] Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 82.

[2] *Ann. Entom. Soc. Amer.*, vol. 5, pp. 193–228.

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tubercles. Mandibles obtusely pointed, with an obsolete tooth on each side before tip: paler than the head at base and black at tips, with many stiff yellow hairs near the middle; malar space very short, with furrow. Maxillary palpi 5-jointed, first joint very short, fourth and fifth longest. Antennæ 34 or 35-jointed, reaching to the tip of the first abdominal segment; first two joints ferruginous, remainder piceous; scape twice as long as thick, pedicel obovate somewhat over one-half as long as the scape; first flagellar joint equalling the scape, but one-fourth as thick as long; following 4 or 5 joints nearly equal, each about one-half longer than the first; remaining ones gradually shortening and becoming more slender. Cheeks and temples smooth and polished, sparsely clothed with yellowish hairs near the base of the mandibles. Prothorax transversely striate; as long as the head above and evenly widened behind when seen from above. Mesonotum very short, irregularly areolate, but with a pair of contiguous well-defined squarish areolæ medially behind. Axillæ large, faintly striate, each with two foveæ toward the median line behind; separated from the scutellum and from one another by crenate impressed grooves; scutellum smooth centrally, but with a few foveæ or large scattered punctures on the sides. Metanotum with large, rather closely placed circular foveæ, the spaces between them showing fine transverse aciculations. Petiole of abdomen straight, of equal thickness throughout, twice as long as the thorax, exclusive of the pronotum, its entire surface somewhat irregularly transverse-striate, on each side with a lateral carina that is much more distinct near its origin at the anterior angles; second segment scarcely over one-third as long as the first, at the extreme base above with transverse striæ; toward the middle microscopically shagreened, and apically microscopically transversely aciculate. Following segments showing very faint traces of aciculation except the last which is faintly shagreened. Mesopleura smooth above, obliquely raised along an oblique line from the base of the middle coxa to below the tegula; on the pleura below and on the pectus transversely aciculate, with some large confluent punctures intermixed anteriorly and just below the lateral ridge. Metapleura sculptured like the metanotum, with a lateral carina which becomes obsolete anteriorly. Fore and middle legs piceous, with the base of the femora, knees and base of metatarsus brownish. Hind coxæ half as long as the petiole of the abdomen and resembling it in size and sculpture except that they are thickened beyond the middle. Hind femora with three teeth below, the largest one at the middle, the next halfway toward the apex and the smallest one-third way to the base; nearer the base is a still smaller, obsolete tooth; in addition with three very small denticles between the middle and subapical tooth. Posterior tibia inwardly at apex with a small pad of yellowish white hairs. Wings hyaline, with fuscous veins; radial cell open on its apical fifth; median and submedian cells closed, of equal length; discoidal cell with only its basal and upper sides indicated by veins. Tegulæ at tip, and root of wing, fulvous.

One female from Manaos, Brazil (Mann & Baker).

This is the second species of Fœnatopus to be described from Brazil, all the others being of African provenience. It differs from *F. annulipes* Kieffer from Pará, Brazil, by its orange-colored head, absence of transverse striæ on the mesonotum and lack of

punctures on the sides of the prothorax, as well by its shorter ovipositor. It is also much smaller, 14 mm., instead of 30 mm.

FAMILY EVANIIDÆ.

Hyptia libertatis sp. nov.

♂. Length 4.5 mm. Head, prothorax, scape of antennæ, fore legs, spot on base of their coxæ, and middle legs ferruginous or fulvous; otherwise black. Entire head deeply pitted with thimble-shaped punctures, those on the front quite plainly arranged in arcs with the base of the antennæ as center; between the punctures with faint aciculations running with the lines of punctures on the front and vertically on the cheeks. Inner orbits narrowly impunctate below and continued across the malar space as a raised smooth strip. Punctures of posterior part of head arranged in vertical lines. Below the antennæ the color of the head becomes much lighter, pale yellowish brown; mandibles of same color, with black tips; palpi fuscous, paler at the articulations. Antennæ 13-jointed; scape ferruginous, flagellum piceous; scape four times as long as thick at apex, as long as the first and second joints of the flagellum taken together; pedicel as long as thick, half as long as the first flaggellar joint; flagellar joints increasing very slightly in length from the first to third and subequal from thence onward; those at the middle distinctly thicker than at base and apex; joints 1 to 6 twice as long as thick. Thorax above punctured like the head, with distinct transverse aciculations between the punctures on the mesonotum. Metathorax just above the insertion of the abdomen with a small smooth, polished space. Propleura smooth, with an oblique femoral impression; at root of wing and below with several foveæ. Mesopleura with a smooth femoral impression above which are several irregular foveæ, and below finely punctate with some large punctures intermixed. Metapleura reticulate, with the femoral furrow smooth on its lower half; posterior declivity of metathorax similarly reticulated, but so densely clothed with silvery pubescence that the sculpture is nearly obscured. Abdominal petiole longitudinally aciculate above, with sparse, medium-sized punctures, and sparsely clothed with appressed glistening white hairs; body of abdomen obovate, highly polished. Four anterior legs, except middle coxæ, fusco-ferruginous; hind legs entirely black, their tibiæ and tarsi without spinules; longer spur of tibia half the length of the metatarsus. Wings hyaline, venation piceous; costal cell complete; submedian vein as long as the costal cell, with a swelling just beyond its middle.

One specimen, Independencia, Parahyba, Brazil, Mann and Heath.

This pretty little species resembles *H. spinulosa* Kieff., but has the hind legs black and lacks the spinules on the hind tibia.

FAMILY CHALCIDIDÆ.

Eniaca neotropica sp. nov.

♀. Length 3.8 mm. Head and thorax æneous; abdomen black; antennæ, four anterior legs and hind tarsi ferruginous; fore wings strongly tinged with brown,

hind ones hyaline. Head above very coarsely and closely punctate so as to appear reticulate, each depression with a stiff glistening hair at its center. Anterior median emargination as deep as the length of the eye when seen from above, just reaching the median ocellus. Each side of the frontal horns margined above and below on its carinate lower edge. Antennæ 13-jointed, the scape slender, obclavate; flagellum considerably thickened toward the apex; one ring-joint, the first flagellar joint slightly longer than the pedicel, one-third longer than the second which is quadrate; following joints to the club of about equal length, but becoming thicker. Length of head below twice its height. Thorax sculptured like the head, the scutellum weakly carinate medially on its anterior half, the carina extending over the mesonotum where it is, however, less distinct. Metanotum with its lateral angles strongly produced into large, blunt teeth, posterior angles more acutely produced into small teeth; lateral margins carinate and the pleural surface separated from the dorsal one by a carina which curves inward medially; metanotum coarsely, obliquely reticulate on its anterior half, which bears a large shield-shaped areola; behind with a Y-shaped carina that defines a pair of areolæ at the apex of the metanotum. Pleuræ sculptured like the notum, except the large mesosternal furrow which is closely, transversely striated; metapleuræ below on each side with two tooth-like projections along the posterior margin. Petiole of the abdomen with four longitudinal carinæ above in addition to another somewhat oblique carina on each side; between the carinæ minutely roguse; seen from above, the petiole is as long as broad at base and distinctly widened apically. Second segment covering two-thirds of the abdomen, its posterior margin strongly curved forward medially; basal two-fifths longitudinally striate except on the sides remainder highly polished, except for a faint shagreen on the sides; following segments smooth anteriorly, shagreened posteriorly and clothed with sparse glistening hairs laterally. Hind femora below (on the outer side) with a series of closely placed minute, pectinate teeth; above with a fine carinate line, but no teeth. Wings with the marginal vein one-fourth longer than the submarginal; stigmal and postmarginal not developed. Ovipositor not extruded.

One specimen form Ceará–Mirim, Rio Grande do Norte, Brazil. Wm. M. Mann.

This species may be distinguished as follows:

1. Antennæ, or at least the entire flagellum, black..... 2
   Antennæ entirely ferruginous (Brazil) *neotropica* sp. nov.
2. Scape of antennæ rufous, flagellum black; hind tarsi red. (Texas, (U. S. A.).....*texana* Ashm.
   Antennæ entirely black; hind legs entirely black.....*hesperidum* Rossi.

FAMILY PERILAMPIDÆ.

Perilampus injactans sp. nov.

♀. Length 2.5 mm. Head and thorax black, pleuræ and abdomen with a purplish blue reflection; antennæ reddish brown near tips, especially below; femora black, with strong blue reflection, tibiæ fuscous, pale yellow at base and apex, tarsi

yellowish white, with the extreme tip dark. Wings hyaline. Occiput behind the ocelli finely, irregularly transversely striate and finely shagreened forward to the level of the anterior ocellus. Facial basin smooth and polished, margined laterally by a raised line that separates it from the narrow orbits and curves inward above to include the anterior ocellus. Lower corners of facial basin striated, their striæ extending upwards for a short distance along the orbits. Clypeus with a few large shallow punctures; face at sides of clypeus minutely rugulose; genæ vertically striated, these striæ extending upwards to meet those on the occiput. Thorax and scutellum umbilicately punctate except for the axillæ and a space external to each parapsidal furrow. Scutellum with a carinate margin that is emarginate at tip to form two blunt teeth. Tegulæ rufo-fuscous. Metathorax with a strong median carina. Mesopleura with a large, irregular depression above and a number of smaller, circular foveæ below. Wings with the marginal vein distinctly longer than the post marginal and twice as long as the stigmal.

One specimen, Ceará-Mirim, Rio Grande do Norte, Brazil, Wm. M. Mann.

This species has the orbital space on the sides of the front usually narrow, and only slightly widened above; the eyes are large, separated by only the width of the antenna from the base of the mandibles, and the malar furrow is distinct. There is no ridge or carina on the face near the side of the clypeus. It is most closely related to *P. bakeri* Crawford recently described from North America, but the facial carinæ extend below the insertion of the antennæ, and the scutellum is deeply emarginate at apex.

Family CLEONYMIDÆ.

Pelecinella Westwood.

There is a specimen of this remarkable genus which represents an undescribed species. Three species have previously been described, all from Brazil, which may be distinguished from the present one as follows:

Key to the Species of Pelecinella.

1. Body and legs mainly black, with more or less bluish, greenish or purplish reflections 2
   At least the abdomen in great part rufous; legs rufous or brown 3
2. Prothorax rufous on the sides; joints 2–4 of hind tarsi white, hind metatarsus black ..... *phantasma* Westw.
   Prothorax entirely black; hind metatarsus white, following joints dark brown or piceous ..... *ashmeadi* sp. nov.
3. Head above, and thorax above (rarely entirely), abdomen, except segments 2 and 3, black; ovipositor half as long as the body ..... *howardi* Ashm.
   Head, thorax, except above, and abdomen, rufous ..... *westwoodi* Ashm.

Pelecinella ashmeadi sp. nov.

Female: Length 22 mm.; ovipositor 14 mm. Black, slightly æneous on the head, thorax, petiole of abdomen and legs; abdomen greenish on the second segment and with a purplish-blue cast on the third and following segments. Hind tarsi with the first joint entirely yellowish white, the succeeding joints fuscous; second trochanter on front legs and extreme base of four anterior metatarsi rufous or yellowish brown. Body slightly white-pubescent on the thorax and legs, densely so on the face, the hairs on the hind tibiæ stiff and erect though short, black on the apical third of the tibia. Head deeply furrowed medially above the antennæ; on the sides striate above the middle, vertically rugoso-striate below. Antennæ as in *P. phantasma*. Face shagreened, with a shield-shaped bare area medially just above the lower margin; cheeks with a few large punctures; malar line distinct. Prothorax finely transversely aciculate above, smooth laterally; mesonotum more coarsely aciculate, smooth and sparsely punctate on the posterior part of the lateral lobes exteriorly; axillæ and scutellum sparsely punctate, not separated anteriorly. Metanotum transversely aciculate on its posterior half as well as near the median line anteriorly, towards the anterior angles sparsely punctate and on the pleuræ behind densely punctate. Pro- and mesopleuræ closely punctate, the latter with a long, deep, smooth femoral furrow. Petiole of abdomen very finely transversely aciculate above, cylindrical in form, as long as the hind coxæ; remainder of abdomen smooth, as usual in the genus. Anterior tibiæ each with nine or ten fine teeth or denticles along the inner margin, those toward the apex smaller and more approximate. Hind coxæ with a few transverse striæ above toward the apex. Wings hyaline; marginal vein four-fifths as long as the submarginal; stigmal punctiform; postmarginal attaining the wing-tip.

One specimen, Abuná, Rio Madeira, Brazil. Mann and Baker.

It gives me great pleasure to be able to dedicate the present species of this most remarkable genus to my friend, the late William H. Ashmead, who showed me years ago the two Brazilian species which he himself described.

FAMILY SCELIONIDÆ.

Hoplogryon fortis sp. nov.

♂. Length 2 mm. Black; legs fuscous; basal half of antennal scape brownish; wings hyaline, with fuscous veins. Head, seen from above, fully twice as broad as thick anteroposteriorly; occiput and temples weakly striate, the striæ extending parallel to the raised posterior margin of the head; ocelli large, in a small triangle, the posterior ones one-half farther from the eye-margin than from one another; front above polished, on its lower half coarsely vertically striated, the striæ extending higher on the sides than at the middle and converging below so as to pass between the base of the antennæ and the eyes, leaving a smooth stripe extending upwards from between the antennæ; cheeks striate, their striæ converging with those of the front toward the anterior edge of the insertion of each mandible; clypeus

transversely striate. Antennæ 12-jointed, scape reaching to the anterior ocellus; pedicel globular, one-third as long and nearly as thick as the first flagellar joint; second and third each somewhat shorter than the preceding; following subequal, the apical ones somewhat longer and considerably more slender; third flagellar joint scarcely over twice as long as thick and only feebly toothed beneath. Mesonotum shining, with sparse, rather weak punctures, longitudinally striate medially on its posterior half, the striated area not extending more than halfway from the median line to the tegulæ. Scutellum finely, irregularly rugose, a small space on the middle of its disc more finely sculptured; with a punctate line just inside of the posterior edge which is raised; postscutellum with a stout thorn which appears triangular in dorsal view. Metathorax closely rugose, its posterior angles produced as prominent thorns of about the same size as the postscutellar one. Pronotum not visible from above, finely sculptured, but shining; propleuræ rugoso-punctate, more finely so below; mesopleura with an oblique femoral impression which is transversely marked with coarse grooves; metapleura shining, with a small impression near the middle and a few oblique striæ at the base of the coxa. Abdomen obovate; petiole a trifle longer than wide at base, twice as wide at apex as at base, with parallel longitudinal striæ; second segment one-third longer than the first, nearly twice as broad at apex as at base, with a depression across the base, striated, the striæ spreading out fan-shaped behind and becoming much finer laterally where they are parallel with the lateral margin of the segment; third segment no wider at apex than at base, as long as wide and as long as the first and second together; finely longitudinally striated except at extreme apex, its striæ parallel; following segments smooth, rapidly growing shorter. Marginal vein long, a little more than half the length of the submarginal; stigmal vein one-fourth as long as the marginal and scarcely knobbed at tip; postmarginal wanting.

One specimen from Independencia, Parahyba, Brazil, Mann and Heath.

The very large and stout metathoracic spines, short antennal joints and abdominal sculpture will serve to distinguish this species from its congeners.

Macroteleia herbigrada sp. nov.

♂. Length 4.5 mm. Black, legs; except coxæ brownish yellow; antennæ brownish yellow below, piceous above; wings subhyaline, with fuscous venation. Head about half wider than thick antero-posteriorly, above with coarse separated punctures which have a tendency to assume longitudinal series behind the ocelli; in front of the ocelli they are irregular and farther apart, except for a dense row of smaller ones along the inner eye-margin; front medially with a shallow, smooth depression to receive the antennal scapes; malar line deep, over half as long as the scape, the front above it closely punctate; cheeks and temples coarsely and more sparsely so. Eyes bare; ocelli large, especially the posterior ones which almost touch the eye-margin. Antennæ 12-jointed; scape as long as the narrowest width of the front; pedicel slightly shorter than the first flagellar joint, which is twice as

long as thick, these together as long as the scape; second flagellar joint rounded, but little longer than thick; third one-half longer than thick, larger than the second and excised beneath; fourth to ninth passing from submoniliform to subquadrate each somewhat longer than thick. Pro- and mesonotum coarsely and sparsely punctate, shining; the punctures larger on the pronotum behind; parapsidal furrows complete, straight; almost twice as far apart in front as behind; lateral margin of mesonotum with a deep groove next to the tegula which extends forward along the lateral margin as a crenate line to meet the parapsidal furrow. Scutellum with a curved row of very large, closely placed punctures anteriorly and a similar straight row posteriorly; its disc finely and sparsely punctate; postscutellum very short, of even width, coarsely longitudinally grooved. Metathorax with two blunt teeth behind toward the sides. Propleuræ irregularly sculptured, smooth on the upper anterior portion; vertical strip between pro- and mesopleuræ longitudinally grooved; mesopleuræ with an oblique depression to receive the femora, this depression smooth except for an oblique line of punctate grooves behind the middle; metapleuræ irregularly rugose; mesosternum coarsely punctate. Abdomen twice as long as the head and thorax together; first segment scarcely longer than broad, toward each side with a longitudinal carina that extends backwards as far as the apex of the third segment; between these with three carinæ that converge and become weaker behind, only the middle one extending on to the base of the second segment; between the carinæ the first segment is more or less distinctly irregularly longitudinally striate. Second segment twice as long as broad, punctate-reticulate; third segment a little longer, similarly sculptured; fourth as long as the second, fifth and sixth growing shorter, narrower, and more finely sculptured. Venter punctate, sparsely pale pubescent and with a stout median carina. Legs obscure brownish yellow the clavate portion of the hind femora infuscated. Marginal vein one-half longer than the stigmal; postmarginal nearly twice as long as the marginal.

One specimen from Independencia, Parahyba, Brazil, Mann and Heath. This was taken in sweepings.

Hoploteleia pallipes sp. nov.

♂. Length 4.8 mm. Head, including flagellum of antennæ, postscutellum, metathorax and abdomen, black; lower part of mesopleuræ piceous; mesonotum and propleuræ ferruginous; legs light brownish-yellow, coxæ fuscous; wings subhyaline. Head twice as broad as thick; ocelli large, in a triangle, with the lateral ones removed by less than their diameter from the eye-margin; surface of head with large, separated thimble-shaped punctures above, on the front, and cheeks, the ones on the cheeks more irregularly placed; mandibles ferruginous. Antennæ 12-jointed; scape brownish-yellow below, almost as long as the three following joints; pedicel much constricted at base, pale below; two-thirds as long as the first flagellar joint; first flagellar joint twice as long as thick; following becoming almost imperceptibly shorter to the longer, pointed apical joint; flagellum scarcely thickened apically. Eyes large, broadly oval, bare. Mesonotum with a few, irregularly placed, large punctures; parapsidal furrows deep, straight, converging behind; median furrow complete, but not so deeply impressed. Scutellum large,

with straight base and sides, narrowed behind; its base with a series of three impressions on each side, the lateral one largest and the median one smallest; disk with very large, close-set punctures; apical margin with a series of small foveæ; lateral margins carinate. Postscutellum, or base of metanotum produced into a bidentate median process; margin separated at the base from the scutellum by a curved, coarsely crenate line; its anterior margin carinate on each side, the carinæ extending to the bidentate process; on each side of the process with a triangular areola, below which the metathorax is densely white-hairy. Propleuræ coarsely punctate above, smooth below; mesopleuræ obliquely impressed medially with a series of horizontal grooves, distinct around the edges, but obsolete near the middle of the impression; mesosternum rather coarsely punctate; metapleuræ irregularly rugose. Abdomen one and one-half times as long as the head and thorax together; of six visible segments, gradually widening to the apex of the third, then gradually narrowed to the truncate, bispinose apex; first segment one-third longer than wide at the tip, which is one-third broader than the base; with two approximate longitudinal carinæ medially, which enclose a deep, smooth furrow; laterally with a carina which extends backwards to the tip of the fourth segment; its surface like that of the succeeding segments, pitted with coarse punctures which assume a very decided longitudinal linear arrangement on the first to fourth segments; second segment as long as broad at apex, narrower basally; third and fourth segments quadrate; fifth smaller and narrowed at apex; sixth half as long, rounded at tip except for the two spines. Legs slender. Anterior wings with the submarginal vein extending nearly half the wing-length; marginal vein about five times as long as thick, almost as long as the straight, oblique, knobbed stigmal vein; postmarginal vein twice as long as the marginal; several other veins faintly indicated by thickenings; hair fringe very short; tip of wing attaining the tip of the fifth segment of the abdomen.

One specimen, Pará, Brazil, Wm. M. Mann. This species is very different in the sculpture of the head and abdomen and in wing venation from the Brazilian *H. rufidorsum* described from Rio de Janeiro by Kieffer.[1]

Family DIAPRIIDÆ.

Xanthopria gen. nov.

Head rounded, produced at the insertion of the antennæ. Eyes bare; ocelli in a triangle, far from the eye-margin. Antennæ 11-jointed, gradually swollen toward the tip, the club, although not distinctly marked off, including five or six joints. Mesonotum without parapsidal furrows, its posterior margin straight or slightly arcuate; axillæ somewhat elongate oval, but with the anterior and posterior margins more or less parallel; scutellum with a large oval or trapezium-shaped depression at the base, convex, with a median carina posteriorly which is sometimes elevated to form a distinct tooth. Metathorax with a median, backwardly-curved tooth or spine at the base; with median, lateral and transverse posterior carinæ; the posterior angles somewhat produced. Abdomen with the petiole about as wide as long; second segment very large, others extremely short; fore wings with-

[1] Ark. f. Zoöl. vol. 1, p. 533. (1904.)

out, or with a very short, hair-fringe; marginal vein attaining the basal-third of the wing, the stigmal vein swollen, oblique, more or less wedge-shaped. Legs rather short; tibial spurs very short.

Type: X ♂. *opaca* sp. nov.

This genus seems to be most closely related to *Acanthopria* Ashmead represented in the West Indian Islands, differing, however, in having only eleven antennal joints. Only three other genera in the family have 11-jointed antennæ, *Notoxopria*, *Solenopsia*, and *Doliopria* and none of these are closely related to the present genus.

Xanthopria opaca sp. nov.

♀. Length 1.6–1.7 mm. Light fuscous, head piceous below the antennæ and about the ocelli; abdomen blackened along the sides and at apex; legs and antennæ considerably lighter than the body. Ocelli close together in a triangle the posterior pair a little farther from the eye-margin than from one another; vertex strongly elevated at the ocelli, the front with a vertical grooved depression between them and the antennæ; eyes ovate, rather small, with large facets, acute below; face slightly convex, the small clypeus protuberant; entire head closely, minutely rugose, opaque, except for a subshining area on the cheeks; antennæ nearly as long as the body, 11-jointed; scape as long as the four following joints together; pedicel cylindrical, as long, but thicker than the second flagellar joint and three-fourths as long as the much more slender first flagellar joint; third and following joints of flagellum about equal, but becoming thicker, the club very gradual, but rather distinctly 6-jointed, its joints except the last nearly quadrate. Mesonotum without parapsidal furrows, its posterior margin straight; scutellum with a large trapezium-shaped depression at the base to each side of which lie the axillæ and behind which lies the convex, rounded-quadrate body of the scutellum; scutellum behind with a short median carina; post-scutellum unarmed; metanotum with a median, blunt spine at the extreme base; the lateral and posterior margins raised and the posterior angles slightly projecting; entire mesonotum, axillæ, scutellum and propleuræ finely rugose, opaque; mesopleura shining except above; metapleuræ finely rugulose, shining, with a deep circular impression above, clothed with sparse wooly hairs above. Abdominal petiole as long as broad, a little narrowed basally, with sparse wooly hairs above; second segment occupying three-fourths of the abdomen, widest at the middle, with arcuate sides, smooth and highly polished; third segment short; others scarcely visible. Legs rather stout, tibial spurs minute. Anterior wings short and broad, distinctly brownish especially on the anterior half, entirely without hair-fringe; submarginal vein one-third of the wing length, gradually thickened before the short, stout, oblique stigmal vein; hind wings with a long fringe on the posterior edge.

Three specimens, Independencia, Parahyba, Brazil, Mann and Heath.

Xanthopria nitida sp. nov.

♀. Length 1.5 mm. Ferruginous, the abdomen beyond the petiole piceous, the head infuscated above and the legs brownish-yellow. Head smooth and shining, with a few conspicuous hairs; ocelli as in the preceding species; front without a median depression; antennæ with the scape as long as the four following joints together; pedicel as long as the second flagellar joint, thicker apically; first flagellar joint slender, one-fourth longer than the pedicel; fourth and following joints, except the last, more or less moniliform, the club very gradual, but rather distinctly 6-jointed; eyes oval, more narrowed below; face convex, slightly sculptured, but shining. Mesonotum polished, smooth, without parapsidal furrows; fovea at base of scutellum rounded, scutellum smooth, with a short, sharp carina which is elevated behind so as to appear as a tooth when seen from the side; metanotum with a sharp median tooth curved backwards; behind this with a median raised line extending to the raised posterior edge; sides also with a broad, carinate margin, the two areas thus formed smooth; posterior angles sharply produced; pleuræ smooth and polished, except the metapleuræ which are rugulose and clothed with short sparse hairs. Abdominal petiole as broad as long, clothed with short, glistening hairs; second segment covering three-fourths of the abdomen; three following segments very short, subequal. Anterior wings subhyaline, yellowish apically; vein one-third the wing length gradually thickened before the short, oblique stigmal vein; margin with a short hair-fringe apically and behind. Legs as in the preceding species.

Two specimens from Independencia, Parahyba, Brazil, Mann and Heath.

This species although similar to the preceding, differs by its shining head and thorax, spined scutellum and distinct median carina on the metathorax.

Hoplopria grandis sp. nov.

♀. Length 7 mm. Black, the legs more or less piceous; wings brown, with three hyaline spots along the anterior border and a hyaline streak on the disc. Head smooth and polished above, the large ocelli on a distinctly raised area; no spine between them; occiput prolonged into a narrow obtuse projection; front smooth and polished, the ledge below the antennæ very prominent, margined; face with a grooved depression on each side which meets the one of the opposite side above to form a large depressed area; below each groove extends laterally around the edge of the clypeus. Eyes large, oval, bare; cheeks as wide as the eyes, smooth and polished. Antennæ 12-jointed; scape distinctly longer than the head-height, arcuate, irregularly striated, bispinose at tip; pedicel half the length of the first flagellar joint; second flagellar joint two-thirds as long as the first and nearly three times as broad as long; third to fifth growing shorter and thicker; the fifth to eleventh quadrate; seventh to ninth widest, but the club is not at all pronounced. Head behind with a dense tuft of woolly hair below the level of the upper eye-margin. Prothorax with a dense collar of wool like that on the head; mesonotum smooth,

without parapsidal grooves, but with a median shallow, broad depression, a similar one on each side and a short narrow deep groove next the lateral margin behind the tegula. Scutellum with a large, oval impression at the base each side of the median line and a second one near the lateral edge; the middle of the disc convex, with an impression on each side and three longitudinal carinæ behind it; postscutellum with three strongly raised longitudinal carinæ. Metathorax at the base with a curved thorn, shaped like a bird's beak; concave on each side behind the thorn. Petiole of abdomen four times as long as broad; above with six longitudinal broad, and very shallow, opaque grooves, separated by shining lines; with a covering of whitish woolly hairs along the sides and below, and with a ring of loose sparse, woolly hairs before the apex; second segment lanceolate, nearly twice as wide at apex, and three times as wide at middle, as at base; smooth and polished; three times as long as the remaining segments together; third and fourth segments short, subequal, each with a minutely punctate band across the middle bearing a series of stiff hairs; fifth segment narrow but about twice as long as the fourth, finely punctulate and sparsely clothed with stiff hairs. Pro- and mesopleuræ smooth, polished; metapleuræ very rough, but clothed with dense white pubescence. Legs piceous, tarsi lighter, especially the front ones; sparsely hairy, the hind coxæ densely so. Wings deep fuscous, lighter apically and behind; costal vein falling distinctly short of the middle of the wing; marginal vein two and one-half times as long as thick; stigmal very short, punctiform; wing membrane with a hyaline streak below the submarginal vein, more distinct basally, a triangular hyaline area just beyond the stigmal vein, a small, oval subapical hyaline area, well separated from the stigmal one, and a hyaline streak on the disc from the basal third to the apical fourth; hind wings subhyaline.

From Porto Velho, Rio Madeira, Brazil, Mann and Baker.

This large species may be recognized by the color pattern of the anterior wings, the form of the abdominal petiole and the contour of the spine at the base of the metathorax. It falls near *H. rufipes* Kieffer, *H. spinosiceps* Kieffer and *H. bicarinata*, but differs from these in the wing-picture, and abdominal petiole and from the second by the unarmed head.

Galesus debilis sp. nov.

♀. Length 2.4 mm. Black; legs, except coxæ, ferruginous; wings subhyaline, folded longitudinally and deeply notched at apex. Head one-half longer than wide; shining; above with an outwardly bowed series of three large punctures on each side of the median line, with two more along the occipital margin each side of the posterior median one, and a smaller one each side of the middle median one; eyes margined above by an impressed line, separated from the front by a carina which is more pronounced anteriorly; head on the sides with a large impression below each eye; eyes round, bare. Antennæ 12-jointed; scape twice as long as thick; longitudinally grooved; pedicel one-half longer than the first flagellar joint which is one-third longer than thick at apex; second to fourth quadrate-monili-

form; following, except last, moniliform, enlarging and becoming quadrate. Posterior ocelli as far from one another as from the eye-margin, each connected to the eye-margin by a raised line. Pronotum with a series of large punctures along its posterior edge. Mesonotum shining, almost impunctate; parapsidal furrows complete, converging behind, of equal width throughout; lateral lobes of mesonotum scarcely depressed; a deep foveate impression in front of the tegula. Scutellum with two large hoof-shaped foveæ at base, at apex with two small circular ones. Metathorax with a carina in the shape of an inverted V. Petiole twice as long as broad, with three strong longitudinal carinæ above, and a weaker lateral one, marking off four shallow grooves; second segment with the base raised and medially notched from behind; its median furrow extending nearly to the middle. Pro- and mesopleuræ smooth and shining, each margined by a raised line; metapleura pubescent, coarsely reticulate. Legs stout. Wings strongly pubescent, except at extreme base.

One female from Independencia, Parahyba, Brazil, Mann and Heath.

This species resembles *G. sulcaticeps* Kieffer, differing by its larger size, longer petiole, shorter first and second flagellar joints and longer scape. In certain lights the front shows a trace of the median lanceolate area present in *sulcaticeps*.

NOTE ON THE MOUTHPARTS OF ORTHOPTERA.

By H. H. Nininger,

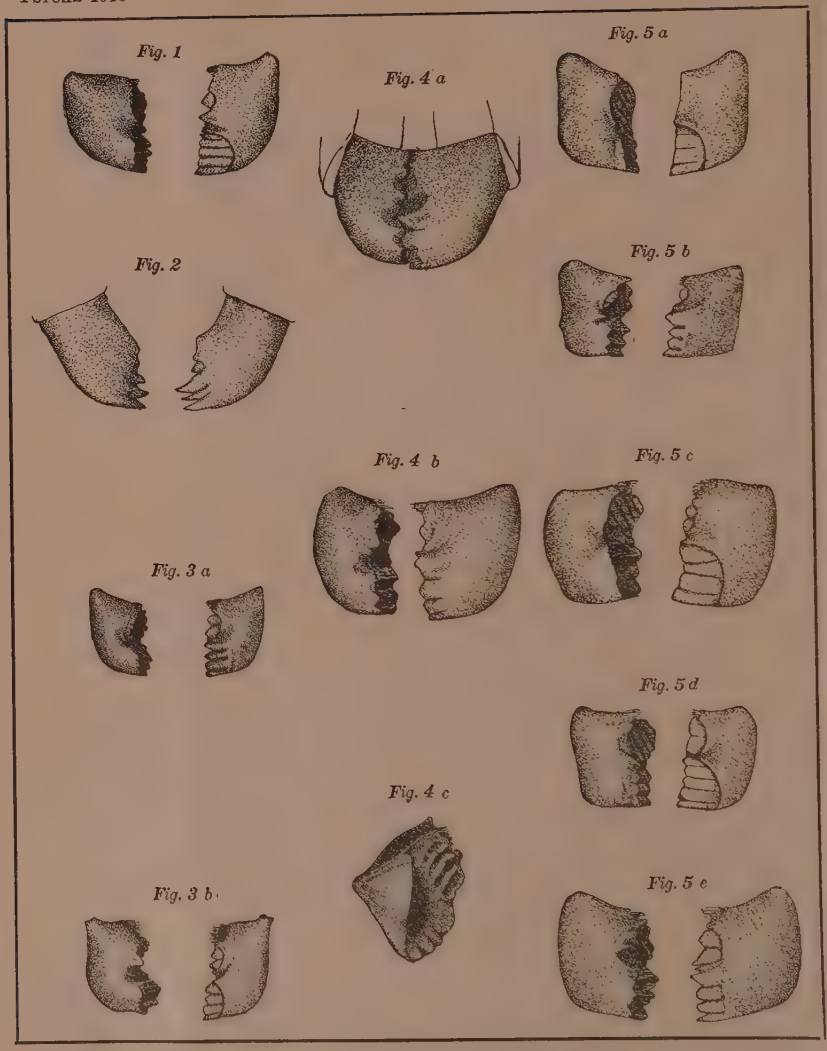
Palmera College, Lordsburg, California.

This paper is presented for the purpose of calling attention to an error which appears in some of our most widely used text-books on general zoölogy and entomology, as well as in other works which deal with the anatomy of Orthoptera.

For several years I have noticed the error, and always find it necessary to warn students against the tendency to see and draw the mouthparts of the "grasshopper" as they appear in the text-book instead of drawing them correctly from the specimen. For the drawings commonly used in text-books are not only anatomically incorrect, but are also unreasonable. For example, if one refers to Lang's Comparative Anatomy, Part 1, p. 446; or to Parker and Haswell, Vol. 1., p. 621, one finds the mandibles of the Blattidæ represented as two organs identical in form; each bearing three sharp-pointed teeth, which are arranged in exactly corres-

ponding positions. The cutting edges of both mandibles are beveled in exactly the same manner, on the same side, so that were the cutting edges brought together, the point of each tooth on one mandible would come into direct contact with the corresponding tooth on the opposite mandible. Upon a moment's reflection it is clear that such an arrangement would be utterly useless as an organ of mastication. By the use of an ordinary lens one can easily see that such is not the structure, but that the mandibles of the cockroach have their cutting edges quite different the one from the other. Both have toothed edges; but the corresponding teeth on the different mandibles are not exactly alike and never borne in the same position; and are so arranged that those of the left mandible overlap those of the right mandible. This is accomplished by both cutting edges being beveled, the one in the opposite manner from the other so that in coming together they form a crushing apparatus. This structure I have taken pains to show in the accompanying drawing (fig. 1), made from a specimen.

Insects more commonly used to illustrate the mouthparts of the class are the locusts. The mandibles of *Melanoplus femur-rubrum* as represented in Linville & Kelly's General Zoölogy, or Comstock's Manual of the Study of Insects; and those of *Schistocerca americana* represented in Sanderson's Insect Pests of the Farm, Garden and Orchard, all present the same kind of error as that pointed out in the preceding paragraph. All show the two mandibles exactly, or very nearly alike. Unfortunately this error is of such a nature as to obscure the highly specialized structure of these organs for their function of mastication, for the drawings referred to above more nearly represent the true nature of the mandibles of carnivorous insects than those of the vegetable-eating locusts. I have examined many specimens upon this point, representing no less than forty different species and I herewith present several drawings which I have made from specimens selected from various species to show the variations which occur in the mandibles of the locusts. The drawings are made from mandibles mounted in the same position as when closed in the living specimen; but separated enough to show the grinding surface of the right mandible.



Mandibles of Various Locusts.

Fig. 1, *Hippiscus tuberculatus;* fig. 2, Cockroach; fig. 3a, *Melanoplus femur-rubrum;* fig. 3b, *Schistocerca alutacea;* fig. 4a, *Schistocerca americana,* mandibles closed; fig. 4b, same, mandibles separated; fig. 4c, same, left mandible turned over to show grinding surface; fig. 5a, Syrbula sp.; fig. 5b, *Melanoplus differentialis;* fig. 5c, *Disesteira carolina;* fig. 5d, *Encoptolophus sordidus;* fig. 5e, *Melanoplus differentialis*

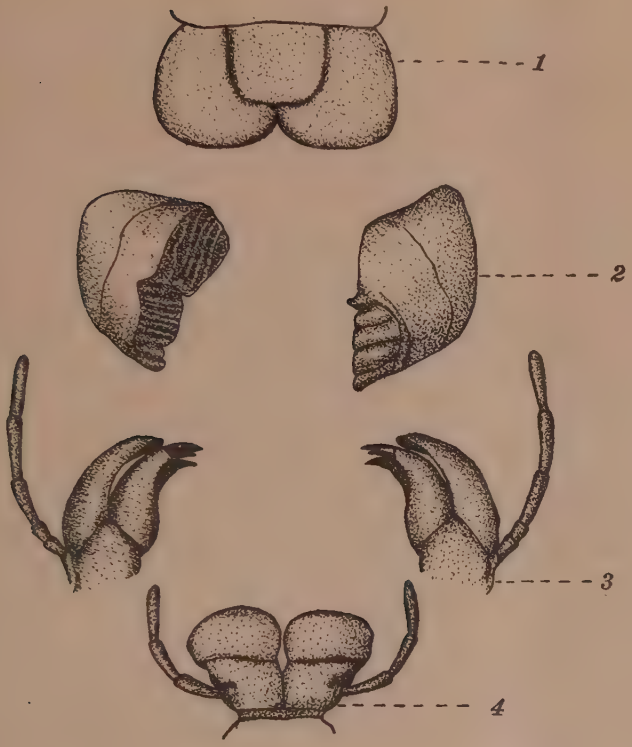


Fig. 1. Mouthparts of Locust, Genus Hippiscus. (Hypopharynx omitted.)
1, labrum; 2. mandibles; 3, maxillæ; 4, labium.

Some of the constant characteristics of the mandible of locusts may be stated as follows:

1. The left mandible is generally slightly, and sometimes considerably larger than the right one; and projects beyond it ventrally when closed.

2. The distal ends of the two mandibles are always beveled, the one in the opposite manner from the other so that when the mandibles are closed these beveled surfaces are contiguous throughout.

3. When the mandibles are closed the anterior aspect presents the cutting edges meeting, not on the median line, but always to the right of it. (Plate 1, fig. 4a).

4. The posterior part of the contact surface of each mandible is fitted for cutting, while the anterior part is fitted for grinding or crushing. (Plate 1, fig. 4c).

McPherson, Kansas.
January 15, 1914.
Now Lordsburg, Calif.

NOTE ON THE HARRIS COLLECTION OF HETEROPTERA.

By J. R. de la Torre Bueno.

During a recent visit to Boston, through the courtesy of Prof. C. W. Johnson I had the good fortune to examine the Harris collection of Hemiptera. Many of the insects, as is well known, passed through the hands of Thomas Say and were named by him and in the absence of types of his species they may be so regarded. The late Prof. P. R. Uhler also examined these insects at leisure and based on his study his authoritative paper "Notices of the Hemiptera Heteroptera in the Collection of the late T. W. Harris, M.D." [1]

The custodian of the Boston Society of Natural History is to be congratulated on the excellent condition of these precious relics. Some one or two have suffered from *Anthreni*, but considering the great age of the collection, the bulk of the specimens are in a marvellous state of preservation. I shall not extend myself to repeat all the details given in the paper by Uhler cited, but certain notations on a few of the species will serve to clear up one or two obscure points.

Lygæus turcicus Fabr., No. 54. The specimens from Michigan under this label are the only ones correctly named. The others are *Lygæus kalmii* Stal, which is not mentioned by Uhler.

Gonianotus marginepunctatus Wolff, No. 65. The specimen under this label and number is the common Eastern *Emblethis vicarius* Horv.

Naucoris poeyi No. 148, "Florida, Doubleday" is *Pelocoris carolinensis* Bueno, characteristic.

Ranatra fusca P. B. No. 151, Harris No. 65, determined by Say according to Dr. Harris' manuscript catalogue, is undoubtedly *R. protensa* Mont. It is certainly not *nigra* H. S., as a careful

[1] Proc. Bost. Soc. N. H., XIX, 365–446, 1878

comparison of the insect with Herrich-Schaeffer's figure will show.

Ranatra quadridentata Stal No. 152. The specimen under this name and number is a typical *R. americana* Mont.

Belostoma americanum Leidy No. 155, Harris No. 109 is *Lethocerus obscurus* Duf.

Under the label *Notonecta insulata* Kirby, No. 156, are placed Harris' Nos. 17δ and 17ε which Uhler has referred to *N. undulata* Say in his work cited. He remarks that "It varies also in size, ranging from 9 to 12½ millims in length." The discrepancy in size arises from the fact that 17ε is *N. variabilis* Fieb. The other specimens are correctly labelled as they stand.

To recapitulate: The following species did not appear in Uhler's paper under their proper names, but as the species with which they are synonymous.

Lygæus kalmii Stal = *L. turcicus* Uhl., not Fabr. for all except those from Michigan, for the specimens under No. 54.

Emblethis vicarius Horv. = *Gonianotus marginepunctatus* Uhler, not Wolff. for specimen No. 65.

Pelocoris carolinensis Bueno = *Naucoris poeyi* Uhler, not Guérin, for specimen No. 148.

Ranatra protensa Mont. = *R. fusca* Uhl., not Palisot de Beauvois, for specimen No. 151.

Ranatra americana Mont. = *R. quadridentata* Uhl., not Stal for specimen No. 152. (N. B.—This applies to all the specimens from the Northern and Eastern United States, as well as Canada, so determined by myself and others, prior to 1910.)

Lethocerus obscurus Dufour = *Belostoma americanum* Uhl., not Leidy, for specimen No. 109.

Notonecta variabilis Fieb. = *N. undulata* Uhl., not Say, for specimen 17ε.

WOOD-BORING TRICHOPTERA.[1]

By J. T. Lloyd,
Ithaca, N. Y.

In the cold, alder-bordered streams of the uplands swamp near Ithaca, N. Y., are found Caddis-worms whose case-making habits

[1] Contribution from the Limnological Laboratory of the Department of Entomology in Cornell University.

differ greatly from those of described American Trichopterous larvæ. Instead of the usual dwellings of stones or twigs, or tubes of silk, these utilize fallen twigs of wood from the stream-bottom. The twigs are hollowed from end to end, and lined with silk, forming portable cases which are a natural part of their surroundings. These belong to an undescribed species, whose larvæ abound among the litter of branches and twigs, from the surrounding forest. In spite of their abundance they are most inconspicuous among the débris. They crawl with a jerky motion, as if swayed by the passing current, or rest, as if lodged, on a submerged branch, and when disturbed, let go, drifting down stream with the current.

The twigs used as cases vary greatly in length and diameter, apparently being selected at random from the litter on the bottom of the forest stream. Sometimes pieces of heavy bark or fragments of broken wood are used. A cylindrical hole always penetrates the wood from end to end. In some twigs the chamber forks near the anterior end, one outlet curving downward and opening to the exterior at one side, while the other perforates the end of the stick. The side outlet, when present, forms the anterior entrance to the case, the other in the end being plugged with silt or with small pebbles. Sometimes the chamber curves downward without forking, as in Fig. 13. The chamber is always lined with silk. (Fig. 13 represents a case with the silk tube cut away, except around the larva.) Although there is considerable variation in the size of the twigs used their average size increases with the growth of the larvæ. To ascertain how the change in cases is made several experiments were made with captive larvæ. Some were removed from their cases and put in cages with twigs of appropriate size. These larvæ did not attempt to use the wood for making new cases, but merely spun silken tubes to which particles of silt adhered; others, which had one side removed from their cases, repaired the damage with silk and silt. One larva repaired the damaged side with silt and fragments of bark and then proceeded to cut away the two ends of its case. It worked from the damaged side of the case, cutting narrow incisions across the twig until the opposite side was reached. The operation of cutting the two incisions across the twig ten mm. in diameter consumed about 24 hours. Two specimens, which were retained in aquaria in the laboratory, attached the anterior ends of their cases securely, by

means of silk, to the ends of solid twigs, and then drilled into the wood, emitting, during the task, an abundance of very finely powdered wood. One of these new dwellings proved too long for its occupant. It was accordingly girdled with a circular incision which was deepened until one end of the twig was completely cut away. Several sticks similarly ringed were found in the creek where the larvæ occur. No doubt this is the usual method of changing cases, as larval growth proceeds.

The food of the larvæ, as demonstrated by examinations of the contents of many stomachs at different seasons, consists of fine powder rasped from submerged wood.

The larvæ are active during the summer, fall, and winter. In February, with the thermometer below 20° Fahr., they were apparently as active as during the heat of summer. By the end of April they had left the middle of the stream and had firmly attached the anterior ends of their cases to some solid support near the streams margin. At this time flat stones were fastened over both ends of their cases, a frequent practice of the larvæ at all seasons, during periods of rest.

The specimens in captivity emerged from June 4 to July 11.

The wood-boring habits of this species may, when we are familiar with more larvæ, prove a not uncommon method of case-making. I have found identical cases in streams on the Western slope of the central range of the Colombian Andes, and also in the Valley of the Magdalena River, east of this range. Similar habits are described and figured by G. V. Hudson in "New Zealand Neuroptera" 1904 for *Triplectides obsoleta* (*Pseudonema obsoleta*) of the family Leptoceridæ. Hudson, however, states that *T. obsoleta* under natural conditions sometimes constructs cases of fragments of leaves.

Following is the description of the wood borer from New York State.

(?) **Ganonema nigrum** sp. nov.

Length of body 11 mm.; front wing 15 mm.; expanse 32 mm. Dominant color of wings and body dull smoky black. Head black or dark brown with jet black hairs. Antennæ dark brown with black hairs. Maxillary and labial palpi lighter brown with black hairs. Membraneous intersegmental portions light, broken between the head and the prothorax on the venter by a projection of the prothorax and on each side by a similar projection. On each side of the neck there is a white, somewhat

oval, prominence which bears long black hairs. The chitinous portions of the prothorax are black or dark brown with several lighter areas which bear tufts of long black hairs. Ventral side of the prothorax mostly white and unchitinized, except for a narrow median strip which projects backward between the coxæ of the mesothorax. A narrow chitinous plate projects obliquely upward and forward from each front coxa and bears a tuft of long black hairs. The meso- and metathorax are black with narrow borders of lighter color along the sutures. The abdomen has three narrow black lateral lines, the middle one narrowest and extending only as far forward as the second segment; above and below these lines the color is dark brown, below them it is lighter. One or two gill-like processes, some of which bear black hairs, project from the sides of each of the first five abdominal sutures. The femur, trochanter and tarsus of each leg is rather densely clothed with short black hair. Each fore coxa has two parallel rows of black hairs between which the femur fits when the leg is folded. Each of the two succeeding coxæ is provided with a single row of long hairs. For details of the genitalia consult Figs. 2, 3, 4, 5, and 6.

Larva: Length 18–20 mm., width 3 mm. Color of chitinous portions of head and thorax black when viewed with reflected light, when viewed with transmitted light mounted specimens show faintly lighter markings. The legs are black, ringed with white. Fleshy portions of prothorax and abdomen are pale brownish white. The anal hooks are brown.

The Head is narrowest at its anterior end and broadens very gradually to near its base where it narrows. Behind the place of its greatest diameter it is inclosed within the first thoracic segment. The distribution of setæ on the dorsal surface is shown in Fig. 7. The frons, Fig. 15, has a semicircular line of setæ curving away from the cephalic margin and three other, more, widely separated setæ near each side. Like the heavily chitinized portions of the head and thorax, the frons is thickly marked by minute transverse lines from each of which arise several very minute hairs, giving except under high power, a somewhat scale-like appearance. The mandibles, Fig. 2 are deeply grooved along their inner margin to the very tip of the apical tooth. Besides the apical tooth, two lateral teeth are present on each edge of the groove. From the groove arise three well-defined brushes of hair. The inner brush is directed inward and backward; the middle and cephalic brushes are directed inward and toward the front; the cephalic brush is the most dense and is composed of extremely fine hairs. The labrum, Fig. 9, is crossed by a row of 18–20 strong setæ whose bases almost touch, except on the median line, where there is a greater space. On each latero-anterior angle there is a patch of long fine hairs and in the middle of the cephalic margin a dense line of short hairs.

The Thorax: Prothorax heavily chitinized above and on the sides. The area between and in back of the coxal cavities is membraneous, except two narrow spots immediately in front of the mesothorax. Mesothorax with a chitinous area which extends back over the metathorax as far as the caudal margin of the hind coxæ. Within this area there is a well-defined square bearing eight setæ, Fig. 7. The sides are not chitinous, except for a small black triangle behind each coxa, which bears a circle of about twelve setæ; the venter is free from heavy chitin, except for two narrow yellow spots on the caudal margin. The metathorax is without heavy chitin above. On the sides the distribution of chitinous plates is the same as on

EXPLANATION OF PLATE 2.

Ganomema nigrum sp. nov.

Adult.

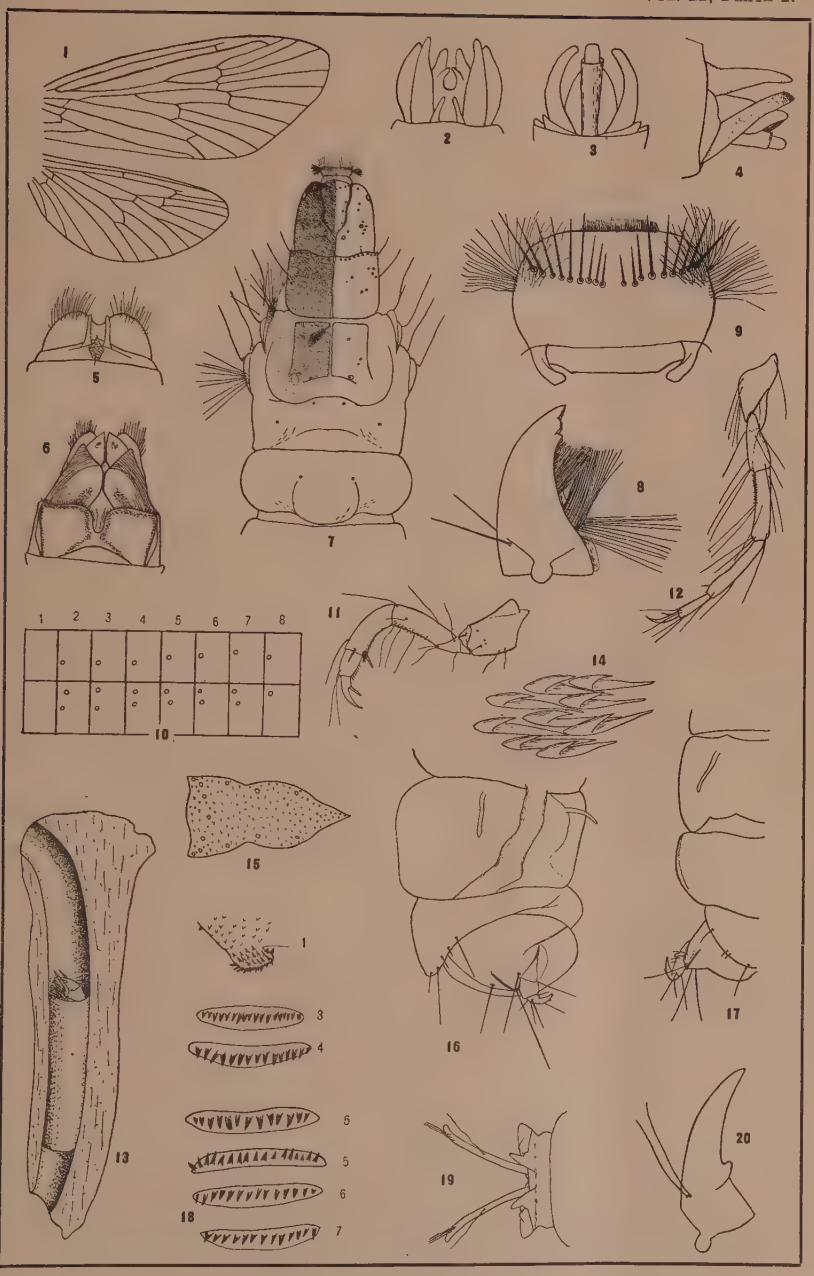
Fig. 1. Wings of Female.
Fig. 2. Male genitalia, dorsal view.
Fig. 3. Male genitalia, ventral view.
Fig. 4. Male, genitalia, lateral view.
Fig. 5. Female genitalia, dorsal view.
Fig. 6. Female genitalia, ventral view.

Larva.

Fig. 7. Head, thorax and first abdominal segment, dorsal view, pigmentation indicated on one side only.
Fig. 8. Mandible.
Fig. 9. Labrum.
Fig. 10. Diagram showing distribution of gills on one side of abdomen in relation to segments and lateral line.
Fig. 11. Front leg.
Fig. 12. Hind leg.
Fig. 13. Larva in case which has been split longitudinally and the silk lining in part removed.
Fig. 14. A few of the hooklets covering the lateral hump of the first abdominal segment.
Fig. 15. Frons.
Fig. 16. Caudal portion of abdomen, lateral view.
Fig. 17. Caudal portion of abdomen, dorsal view.

Pupa.

Fig. 18. Dorsal plates of the left side numbered according to the segments on which they occur.
Fig. 19. Anal appendages, dorsal view.
Fig. 20. Mandible.



Lloyd—Wood-boring Trichoptera.

the mesothorax, the upper mark, however, is not so dark in color as on the preceding segment and bears more setæ, which are less circular in arrangement. The venter differs from that of the mesothorax, only in having the chitinous areas near the caudal margins darker in color. The front leg, Fig. II, is little more than half the length of the succeeding legs, but is more robust. It bears three stout spurs on the inner angle next to the tarsus and one isolated spur on the distal margin. On the inner margin of the basal segment of the tarsus there is a single row of short stout spines. The inner surface of the tibia bears numerous very short spines. The inner surface of the femur is sparsely armed with short triangular teeth. The coxa, on its inner margin, has a few short spines and over its entire surface has rows of fine, short hairs like those described for the frons. The two succeeding legs (Fig. 12 shows the hind leg), differ from the front leg in being longer and less robust and in having fewer and weaker short spines. Each of these legs has but one tibial spur.

The Abdomen is cylindrical and almost uniform in circumference throughout its length. The humps on the first segment are not greatly developed. The lateral humps bear an area of short curved spines whose points are directed forward. The gills are distributed on segments 2–8, above and below the lateral line, as diagrammed in Fig. 10. The lateral line, near the caudal margin of the seventh abdominal segment, ends at the beginning of a fleshy raised line, Fig. 16, which crosses the suture between the seventh and eighth segment and, inclining upward, extends to the caudal margin of the eighth segment. Each side of this fleshy line is armed with curved, bifurcate spines directed backward. The anal hooks and the arrangement of setæ on the last abdominal segments are shown in Figs. 16 and 17.

Pupa: Length, 13 mm. Mandible Fig. 20. Tarsi flattened and fringed on each side by a row of black swimming hairs. Lateral line black. A narrow black line parallels the lateral line beneath, to the caudal margin of the eighth segment, where the two converge. A narrow black line above the lateral line contains the spiracles. Abdominal segments 2–9 with paired tufts of hair near their caudal margins above. On the caudal margin of the first abdominal segment there is a pair of lobes, Fig. 18, covered with sharp spines. Above these lobes are sparse backward-pointing teeth. The chitinous plates of the abdomen are shown in Fig. 18. The posterior end of the pupa is represented in Fig. 19.

TWO NEW SPECIES OF BORBORIDÆ.

By Charles W. Johnson,

Boston Society of Natural History, Boston, Massachusetts.

Leptocera frosti sp. nov.

Female: Shining black. Front broad, face light brown, vibrissæ large, with a row of six smaller bristles extending to the posterior angle of the cheek, above this row near the middle, two prominent bristles, mouth parts and antennæ black, second joint slightly longer than the third, arista dark brown, pubescent and

about as long as the head. Thorax with prominent bristles, scutellum with four strong marginal bristles; pleura brownish below the humeri and wings; a long curved bristle midway between the base of the wing and posterior coxa. Abdomen with a large bristle at the posterior angles of the third and fourth segments. Legs black, bases of the femora and all of the tarsi brown; middle tibiæ with two very large, spine-like bristles at about one-fourth the length of the tibia from the base, and a corresponding pair at about one-fourth the length of the tibia from the apex, the intermediate and apical spines much smaller; metatarsi with three large, apical spines; posterior femora with an upper and lower row of large bristles. Halteres black. Wings dark smoky brown, with the greater portion of the first basal cell, the anterior and middle of the discal cell, a long slightly curved stripe in the middle of the marginal cell, and a large crescent shaped mark beyond the discal cell, subhyaline; the bristles on the first section of the costa double the length of those on the second and third, the length of all the sections about equal. Length 2.5 mm.

One specimen, Framingham, Mass., Oct. 19, 1913, collected by Mr. C. A. Frost while sifting for coleoptera and presented with many other interesting species to the New England collection of the Boston Society of Natural History.

Leptocera palliceps sp. nov.

Female: Front, face and occiput light yellow, shining; antennæ dark brown with prominent bristles, third joint hairy, arista pubescent, as long as the width of the head; vertex with three orbital bristles on each side with narrow black lines extending from the central bristles to a point at the vervex, ocelligerous area brown and bearing two bristles; tip of the proboscis black. Thorax and abdomen black, shining. Legs yellow, middle and posterior femora black. Wings brownish hyaline, with a slightly darker spot in the marginal cell. Length of the third section of the costa about double the length of the second. Length 1mm.

One specimen, Clemonton, N. J., May 12, 1899. Type in the author's collection. This little species seems to be readily distinguished by its entirely light yellow head.

HEMIPTERA-HETEROPTERA OF MAINE.

Corrections and Additions.

Since the publication of my list,[1] it has come to my notice that there are a number of changes which should be made in the records. Some of these have been very kindly brought to my attention in correspondence, others I have noted myself. I am changing here chiefly such things as might cause confusion, preferring to leave for the present matters which are more or less debatable. In a

[1] Psyche, Vol. XXI., 1914, p. 139.

recent paper,[1] Van Duzee discusses several points belonging to the latter class.

P. 140. *Arctocorixa* should read **Arctocorisa.** All the Corixids mentioned belong to this genus.

A. harrisii is a dimorphic ♂ form of **interrupta.**

P. 141. *Horcias limbatellus* is a form of **dislocatus goniphorus** Say.

P. 142. **P. dislocatus** with its varieties belongs to the genus **Horcias.**

Cyrtorrhinus should be deleted.

C. marginatus doubtless= **Orthotylus congrex.**

Orthotylus is correct.

H. citri= **uhleri** Giard.

Stiphrosoma= **Strongylocoris** Blanchard.

Idolocoris= **Dicyphus** Fieber.

Megalocoleus should be deleted.

M. coagulatus belongs to the genus **Orthotylus.**

P. 143. Under **Clinocoris** insert *Cimex* Auct., Linnæus?

Acanthia Auct.

After **Nepa apiculata** Harr. insert Uhl.

P. 144. The record of **Apiomerus ventralis** has been questioned by several correspondents. The data were taken from a specimen in the Boston Society collection, determined by Van Duzee, as I am informed by Mr. C. W. Johnson. It was collected by C. A. Frost, who has taken another specimen at Framingham, Mass.

Zelus exsanguis and **Z. luridus** are considered distinct by Van Duzee. Both forms occur in Maine.

Limnoporus is considered a subgenus of **Gerris** by Torre Bueno, our authority on aquatic Hemiptera.

P. 145. *Tingis* should read **Melanorhopala** Stal.

P. 146. Say's *Lygæus scolopax* is unknown. Uhler's record of *Orsillus scolopax* doubtless refers to **Nysius longiceps.**

P. 147. Before **Aneurus** insert FAMILY DYSODIIDÆ.

C. typhœus should read **C. distinctus** Dallas. As noted by Barber,[2] the description of Dallas makes it clear that the northern form is *distinctus.*

P. 149. *A. sereiventris* should read **A. serieventris.**

Homœmus should read **Homæmus.**

The following records should be added to the list:

Horcias dislocatus scutellatus V. D. Portland.

Lygus tenellus V. D. Me.

Melanorhopala clavata. 15 July. Pownal.

Gsocoris uliginosus Say. 5 July–13 Sept. Pownal, Westbrook.

H. M. PARSHLEY.

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[1] Canadian Entomologist, Vol. XLVI., 1914, p. 377.

[2] Ins. Fla., II., Hem., Bull. Am. Mus. Nat. Hist. Vol. XXXIII., 1914, p. 518.

THE ADVANTAGES CHRYSOMELID BEETLES SECURE BY CONCEALING THEIR EGGS.

By Robert W. Hegner,

Zoölogical Laboratory of the University of Michigan, Ann Arbor, Michigan.

It is obvious to everyone that eggs that are concealed will be more likely to escape destruction than those that are laid in open situations and hence easily seen by predatory animals. There is good reason for believing, however, that in the case of those chrysomelid beetles that lay their eggs on the under surface of leaves, there are other factors involved which make concealment only one of the advantages thus secured. It is the general habit of insects as well as many other animals to hide their eggs. Often this results in their development in the dark. Large numbers of animal eggs develop normally in the dark since those that pass through the embryonic period within the body of an opaque parent or are surrounded by opaque envelopes are effectively shielded from the light. Many experiments have been performed with the eggs of a large number of animals in order to test the influence of darkness upon embryonic development, but the general conclusion has been reached that the lack of light neither retards nor accelerates growth. In beetles' eggs the chorion allows the penetration of light rays and hence the direct rays of the sun must reach the interior of the eggs exposed to them.

So far as I know no one has determined the reasons why many insects lay their eggs on the under surface of the leaves of plants, rather than on the upper surface. The experiments described in this paper were undertaken with the idea of furnishing data which might assist in explaining this phenomenon. The potato beetle, *Leptinotarsa decemlineata*, was found to be favorable for this purpose because of the ease of obtaining its eggs and of rearing it in the laboratory. Besides the normal development of the eggs of this beetle is well known.

It was first proved that there is no difference between the upper and lower surfaces of a potato leaf which causes the beetles to prefer the lower surface, since individuals placed in stender dishes in the laboratory laid their eggs on the under surface of the leaves

as they lay in the dishes regardless of whether this was the upper or under surface in nature.

A series of experiments were then performed in order to determine if direct sunlight is injurious to the developing eggs. These experiments extended over the period from June 11 to June 23, 1914. Fortunately these days were practically cloudless and thus afforded an abundant and uninterrupted supply of sunlight. The details of two experiments will suffice to indicate the nature of the experiments and the conclusions that may be drawn from them.

Experiment I.

On June 15, fifty batches of potato beetles' eggs were collected at random. Each batch of eggs and that part of the leaf to which it was attached was cut away from the rest of the leaf. Thirty-five batches were then pinned firmly to a board and the board was placed on top of the laboratory where the rays of the sun would strike the eggs throughout the day. The remaining fifteen batches were pinned to another board, which was placed beside the other but inverted so that the eggs were in the shade at all times. The results are recorded in Table I.

Table I.

Date.	Sun.	Shade.
June 15	35 batches of eggs	15 batches of eggs
June 16	one batch hatching (did not succeed)	one batch hatched
June 18	one batch lost	three batches hatched
June 19	four batches lost	four batches hatched
June 22	none hatched	five batches hatched
June 23	none hatched	two batches hatched

As shown in the table all of the fifteen batches placed in the shade under the board hatched. Their ages when collected differed greatly since some of them hatched every day until all of the larvæ had emerged. Those that hatched on the seventh and eighth days (June 22 and 23) must have been fresh when gathered, and their hatching must have been delayed for some reason since the normal hatching period is five to six days. Lack of moisture is

suggested as the retarding factor since the eggs were in a rather dry place compared with that in which they are usually laid and it has been found that eggs in the laboratory must be kept in a moist atmosphere to insure the emergence of the larvæ.

Of the thirty-five batches placed in direct sunlight none hatched, but eighteen developed up to the hatching point. Twelve batches showed no signs of hatching at the end of the eighth day. Five of the batches were either blown away or destroyed by some animal. The only animals that could possibly be responsible for the disappearance of these eggs were birds or large insects, but whether or not they were responsible was not determined.

Experiment II.

On June 15, a beetle just about ready to deposit eggs was placed on a plant in the garden and enclosed by a glass jar. Within two hours she laid a batch of thirty eggs. Part of these were taken to the laboratory where they hatched in six days (June 22). The leaf to which the rest of the eggs were fastened was bent over and held in place so that the rays of sunlight would strike the eggs.

At the end of twenty-four hours four of the control eggs and four of those left on the plant were fixed. Sections of these eggs show that development proceeded in both groups at the same rate and that sunlight had no visible influence upon the development of the eggs subjected to it. Another group of four were taken from the plant at the same time and kept in the laboratory in a moist watch glass. These hatched in the normal period (six days). Sunlight acting upon the fresh eggs for a period of one day had therefore no effect upon the development of these embryos.

The eggs on the plant in the sunlight should have hatched on June 22. On this date the larvæ within them could plainly be seen; they failed to emerge within the next two days when the experiment was concluded.

General Conclusions. These experiments prove that the eggs of the potato beetle in various stages of development are prevented from hatching when kept in direct sunlight, but are not retarded in their development. The non-hatching of these eggs is probably due to partial dessication. The advantage of concealment is not so great therefore as that secured by shielding the eggs from the dessicating properties of sunlight, since the potato beetle

race would probably persist even if the eggs were not concealed, but would certainly die out if the eggs were laid where sunlight could act upon them.

TWO NEW ORIENTAL PHORIDÆ.

By J. R. Malloch,
Urbana, Illinois.

Aphiochæta parasitica, sp. nov.

Female: Yellow. Frons slightly darkened towards vertex; antennæ, and proboscis yellow, palpi whitish-yellow. Pleura with a small dark spot below wing base. Dorsum of abdomen brown, each segment with a very narrow yellow posterior marginal line. Legs yellow, mid coxæ with a black spot on their posterior surface; apices of hind femora and dorsal surface of hind tibiæ blackened. Wings clear, veins brownish. Halteres yellow. (This description is drawn from alcoholic specimens. Fresh or dry mounted examples will probably be darker in color.)

Frons slightly longer than broad, the surface with numerous short hairs; post-antennal bristles 4 in number, sub-equal in size; first row of bristles convex, the center pair but little below the outer pair and distinctly nearer to center of frons; antennæ normal in size, third joint rounded; arista bare, about one-third longer than length of frons, palpi projecting beyond apex of antenna, not swollen, and with about 8 distinct black bristles; cheek bristled. Mesopleura bare; scuttellum with 4 bristles, the basal pair slightly the weaker. Abdomen almost bare, only a few very weak setulæ present, the segments sub-equal in length. Legs normal; fore tarsi slender; hind femora and tibiæ dilated; the mid tibial setulæ weak; hind femora with a few weak setulæ on the basal half of the ventral surface; hind tibiæ with 10–11 setulæ extending in a series from basal third to apex, which at no part exceed in length one-half the tibial diameter. Costa to about three sevenths the wing length; fringe close, the hairs not exceeding in length twice the diameter of the costal vein, first costal division about 5 times the length of second; third slightly shorter than second; fourth vein gently arcuated, ending distinctly in front of wing tip, slightly recurved.

Male: Similar to female in coloration. Differs in having the frons rather narrower; the lower pair of post-antennals minute, and the upper rather close together; the antennæ larger, the third joint over one-third as large as the eye; the abdomen tapering; the hypopygium slightly exposed, and the anal protuberance very small, with 2 weak apical hairs; the costa reaching to about two-fifths the wing length, the second and third divisions thereof sub-equal, and the fringe more widely spaced.

Length: 1.75–2.5 mm.

Type: From Heliothis larva, Medan, Sumatra, May, 1912.

Allotype (*Male*): Same data. *Paratypes:* Same data. Five specimens in all.

At least two species with the costa falling short of the wing middle are recorded as parasitic on insects, viz., *fasciata* Fallen, and *nedæ* Malloch. Both of these species were recorded as occurring on Coccinellidæ and are not closely allied to *parasitica*. There are besides the records mentioned in this paper several others already published which serve to show that the parasitic habit is by no means rare in Phoridæ though but few species have so far been reared under observation.

Aphiochæta destructor sp. nov.

Male: Yellow. Antennæ reddish-yellow; palpi pale yellow. Abdomen slightly brownish on dorsum; anal protuberance pale yellow. Legs yellow; mid coxæ with a distinct black spot on posterior surface; apices of hind femora broadly brown. Wings clear, veins yellowish. Halteres yellow. (This description is drawn from alcoholic specimens. The color in fresh or dry mounted examples will probably be slightly darker.)

Frons subquadrate; lower pair of post-antennals distinctly weaker than upper pair; center pair of bristles in first row distinctly lower on frons, and, vertically, about midway between them and the central suture; anntena slightly enlarged, third joint rounded; palpi large, but not swollen, protruding as far as the apex of antenna, about 8 short black setulæ on the under surface of each. Mesopleura with numerous short hairs and a long, black, backwardly directed bristle on the upper posterior portion; scutellum with 4 sub-equal bristles. Abdomen tapering slightly; segments sub-equal; second segment with 2–3 short setulæ on the lateral margins of dorsum; anal protuberance large and stout, its surface with several black hairs, and the apical pair distinct. Legs stout, the hind femora and tibiæ dilated; mid tibial setulæ weak, those on the hind tibia distinct, the longest one about equal in length to one-half the diameter of the tibia, 9–10 in number, and extending from base to apex. Costa reaching to slightly beyond middle of wing, fringe very close, the hairs slightly longer than diameter of costa; first costal division equal in length to second and third together; third about one-fifth as long as second; fourth vein gently arcuated, ending well before wing tip.

Length: 1.75 mm.

Type and Paratype: From Noctuid pupa, Poerwakerto, Java, June, 1911.

This species bears a close resemblance to *scalaris* Loew. in wing characters, but is otherwise readily distinguished especially by the bristling of the mesopleura which is bare in *scalaris*. The long backwardly directed bristle on the mesopleura is found in several previously described species. The European species *ciliata* Zetterstedt is perhaps the commonest and most widely distributed of this group, but is readily distinguished from any of the species that are known to be parasitic, or at least to feed upon

insects in any stage. The species *juli* Brues which has very similar characters on the pleuræ and is almost identical in coloration has been reared from myriapods. *Perdita* Malloch, which is very closely allied to *juli* has been reared from the larvæ of a butterfly, *Eurymus eurytheme*. Besides these two, there are several others possessing the strong backwardly directed mesopleural bristle, but with the exception of *ciliata* Zetterstedt, which I have found on carrion and fungi, and *halictorum* Melander and Brues, which has been recorded from burrows of *Halictus*,[1] nothing is known of their habits. Some of the species in Phoridæ are true parasites, but in some cases they may only attack wounded larvæ, though it is very probable that like certain species in the Tineinæ (Microlepidoptera), and other groups, they will feed readily upon Lepidopterous or other pupæ.

The type specimens of the species were returned to the U. S. Bureau of Entomology, from which they were sent for identification.

THE PREVALENCE OF *MACROSARGUS CUPARIUS* LINN., IN THE UNITED STATES.

By W. E. Britton,

Agricultural Experiment Station, New Haven, Conn.

On May 20, 1914, I received from a correspondent in Wallingford, Conn., several specimens of an unfamiliar insect, with the following accompanying note:—

> Under separate cover, I am sending you some grubs I found on my strawberry plants. They were close to the crown of the plant at the base of the dry leaves. Will you please tell me what they are, what harm they do, and how to get rid of them?

The specimens in question might be taken for either larvæ or pupæ. They were mouse-gray in color, about 10 mm. long, nearly 3 mm. broad, and less than 2 mm. thick. The anal extremity was thin and broadly rounded as seen from above: from it toward the head the sides were nearly parallel for about three-fourths of its length; then it tapered to a narrow elongated head with a hemis-

[1] Biological Bull. V, 1902, p. 14.

pherical projection on each side, the projections resembling eyes. The segmentation was well-marked throughout.

These curious specimens were placed in a breeding cage in the insectary, and on June 1, an adult two-winged fly emerged. An-

Fig. 1. *Macrosargus cuprarius* Linn.
Adult, larvæ and puparium.

other appeared June 15. These were kindly identified by Mr. C. W. Johnson as *Macrosargus cuprarius* Linn., a European species which has become rather abundant in this country.

As the appearance and habits of its immature stages are not well-known, at least, in this country, this note and the accompanying illustration, from a photograph by Mr. B. H. Walden, may serve to call attention to it. Mr. H. B. Weiss has recently recorded (*Ent. News*, Vol. XXV, p. 395: 1914) this species as having been received in New Jersey on Azaleas, imported from Holland in 1913, but he does not state whether it came in the larval, pupal or adult stages.

In regard to the further distribution of this species Mr. Johnson writes as follows:

I first collected about fifty specimens of this species along Second River, above Belleville, near Newark, N. J., June 12–16, 1892. The capture was recorded (*Entomology News*, Vol. 7, p. 94, 1896) under the name of *Sargus nebeculosus* Zett. which is merely a variation of *cuprarius*. As this species had not been recorded from

America and was not represented in any of the older collections, I was inclined to consider it a recent introduction, but this theory has been somewhat shaken since collecting it in considerable numbers at Niagara Falls, N. Y., June 24–28, 1901, and receiving specimens the same year from Mr. G. Chagnon who collected them at Rigaud, Quebec, July 27. In 1903 I came to Boston and was surprised to find it quite common in the vicinity (Blue Hill, May 30, and Auburndale, July 19–Aug. 13.). Since then I have collected it at the following localities:—Hyannis Port, July 4, 1904; Calais, Me., July 10, 1909; Middletown, Conn., June 17, 1909 and Bretton Woods, N. H., June 27, 1913; near Newport, R. I., June 5, 1914. Recently I have received specimens from Brother Germain, taken at Ottawa, Canada.

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The undersigned will greatly appreciate receiving records of New Jersey species not listed in Smith's Insects of New Jersey.—Harry B. Weiss, 272 Hale St., New Brunswick, N. J.

Offered for cash, but exchange preferred. Fitch and early Illinois reports; Insect Life; Harris's Insect; many others.—J. E. Hallinen, Cooperton, Okla.

Histeridæ. North American Histeridæ identified or unidentified, desired in exchange for beetles of other families. F. G. Carnochan, Bussey Institution, Forest Hills, Massachusetts.

Hemiptera-Heteroptera. I desire specimens of this group from all regions, especially New England. I will give in exchange species of this and other orders (except Lepidoptera), and will identify New England material. Correspondence desired.—H. M. Parshley, Bussey Institution, Forest Hills, Mass.

Wanted: Psyche, Vol. VIII, No. 265 (May, 1898); No. 267 (July, 1898); No. 268 (August, 1898); Vol. IX, No. 300 (April, 1901). Address, giving price, Librarian, Stanford University, Cal.

Sarcophagidæ from all parts of the world bought or exchanged according to arrangement. North American material determined.—R. R. Parker, Entomological Laboratory, Massachusetts Agricultural College, Amherst, Mass.

Wanted: Transactions American Entomological Soc., Vol. 4; Entomological News, Vol. 2, Nos. 6 and 10; Vol. 8, Nos. 1 and 6; Vol. 9, Nos. 1 and 2; Vol. 10, No. 10; Vol. 11, Nos. 1, 3 and 5. Will purchase at reasonable price.—Howard L. Clark, P. O. Box 1142, Providence, R. I.

For sale, or in exchange for Henneguy "Les Insectes": Ashmead's "Classification of the Chalcid Flies" (Carnegie Mus., Pittsburg.)—J. P. Baumberger, Bussey Institution, Forest Hills, Boston, Mass.

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